

Pumping Efficiency Into The Process

Pumps can waste enormous amounts of energy if not selected or operated properly.

By Tom Stone

Reducing energy consumption has become a key component in controlling costs at manufacturing facilities around the globe as higher energy costs impact everyone's bottom line. The time has come to find, develop and implement the best ways to make the manufacturing sector—specifically its pumping systems—as energy efficient as it can be.

As spelled out in “Improving Pumping System Performance: A Sourcebook for Industry,” a joint effort between The Hydraulic Institute and the U.S. Department of Energy's Energy Efficiency and Renewable Energy Program, poor design and improper system operation are the root of inefficient pumping systems. As rotating equipment, pumps are subject to wear, erosion, cavitation and leakage. If pumps are not selected or operated properly, they can waste enormous amounts of energy, as well as require considerable maintenance.

When making the final choice in the type of pump to implement, several crucial factors need to be taken into account: required flow rate, suction and differential pressure, temperature, viscosity, etc. Under the incorrect belief that such equipment may address future capacity needs, facility managers too often choose oversized pumps when outfitting systems, ignoring the added energy costs inherent in operating oversized pumps.

At the most basic level, the choice most often comes down to selecting between a positive-displacement (PD) or centrifugal pump. While the majority of the world's pumping may currently be performed with centrifugal pumps, more facility managers and operators are becoming aware of the benefits that are found in sliding vane pumps.

In fact, by virtue of their inherent energy and mechanically efficient designs, PD sliding vane pumps are uniquely suited to offer managers immediate advantages in fulfilling energy-saving initiatives. Although the operating principles of PD and centrifugal pumps differ, in many cases, both designs can be used for the same services. In these overlap applications, choosing PD technology can result in improved processes, uptime and energy savings. PD pumps outperform their centrifugal rivals in several system characteristics that are needed when considering a pumping application.

Depending on the technology chosen, PD pumps may offer:

- Constant flow, relatively, independent of changes in system pressure.
- Constant flow, relatively, independent of changes in pumping viscosity.
- The power to pump high-viscosity products.
- The capacity to handle entrained gases.
- The ability to self-prime and line strip.
- Dry operation for short periods of time.
- Higher efficiency across varying system pressures.

While PD offers these advantages when compared to centrifugal, within the PD family of pumps itself, sliding vane technology reigns supreme.

Possible Solutions

PD pumps pressurize fluid with a collapsing-volume action, essentially moving an amount of fluid equal to the displacement volume of the pump with each shaft rotation. As such, PD pumps have a fixed displacement volume, meaning that the flow rates they generate are directly pro-

portional to their speed, and the pressures generated are determined by system resistance to this flow.

These characteristics make PD pumps appropriate for applications that incorporate viscous working fluids, high-pressure systems, low-flow/high-pressure requirements, precisely controlled flows, or a need for high efficiency. Within the PD family, there are numerous types or technologies available, yet this article will focus only on sliding vane types.

Sliding Vane Pumps

Sliding vane pumps operate through the use of a number of vanes that slide into or out of slots in the pump rotor when the pump is rotating. The vanes move outward from the rotor and ride against the inner bore of the pump casing, forming pumping chambers in the process. As the rotor revolves, fluid enters the pumping chambers from the suction port. The fluid is transported around the pump casing until it reaches the discharge port where it is forced out into the discharge piping. This design virtually eliminates slippage, meaning that the pump's high volumetric efficiency is maintained.

Because sliding vanes continuously self-adjust for wear, these pumps are able to maintain near-original efficiency and capacity throughout their life. The pump speed also does not need to be increased over time, making sliding vane pumps inherent energy-savers.

Sliding vane technology continues to be improved upon. The sliding vane pumps manufactured by Blackmer are used in a wide variety of process and transfer applications within numerous markets, such as: chemicals, crude oils, refined fuels, biofuels, pharmaceuticals, cosmetics, food, pulp and paper, wastewater, soap and detergents, paint and coatings, etc.

Sliding vane technology is being used worldwide to reduce energy cost and consumption, while creating more efficient pumping systems. This technology solves everything from suction, product shear and volumetric efficiency problems to offering unique benefits, such as line stripping and metering—all while saving energy. Simply put, sliding vane technology offers several advantages in the quest to reduce energy consumption and cost without sacrificing performance, making them the ideal PD pump choice in these increasingly energy-conscious times. [CI](#)

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